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COMMUNITIES

WORKING TOGETHER
FOR A
HEALTHIER ENVIRONMENT

Taking a Measure of Community

When these North Carolina towns assess their tree cover, the instruments are high tech, the research is far-reaching, and the practitioners are in their teens.

By Alexis Harte. Photos by Melissa McGaw



The students gain insights into their neighborhoods

that most fifth graders can't imagine.

Raleigh middle school students collect a pleasing bit of field data.

Terms like “map layer,” “vector,” and “GPS unit” are not common parlance on most middle school playgrounds. But, then again, most 5th graders don't have mentors like Charles Carter and Keosha Johnson.

Once a week the high school juniors teach the youth of North Carolina's Wake County Girls Club to build clinometers and calibrate global positioning systems while surveying and digitizing the trees that comprise the Club's grounds.

The two juniors began with the basics, asking students to identify their homes, schools, and the Girls Club on an aerial photograph. (The students showed uncharacteristic enthusiasm for the existence of their schools when seen from the air.)

Having engaged them in the technology, Carter and Johnson then delve a bit further. “Our next goal is to make a map of the Girls Club and calculate how much energy savings the trees provide,” says Johnson, 16. Last year, she and Carter

conducted a thorough inventory of the county's Boys Club's grounds. Using AMERICAN FORESTS' CITYgreen software to model tree growth over five, 10, and 20 years, she and Carter were able to quantify the expected energy savings based on different projections of how much canopy coverage the trees would provide.

Now, they are teaching the Girls Club youth to do the same.

Carter and Johnson's efforts over the last year illustrate a growing trend: Middle and high school students are using increasingly sophisticated techniques to explore their local environment and their own role in shaping its future.

The two juniors' teaching efforts are part of a larger initiative sponsored by the North Carolina GIS Consortium, a network of state agencies, universities, municipal GIS users, and software companies working to bring sophisticated and engaging technology into North Carolina classrooms.

Not surprisingly, the students gain insight

into their neighborhoods that most fifth graders can't imagine.

"They are able to see that you can't simply remove trees from the area without facing some real consequences," says Bill Thomas, director of teen programs for the Wake County Boys and Girls Club. September 11 brought \$150,000 in funding cuts, forcing Thomas to find new ways to save the organization money. He beams, "By planting more trees now, the students are able to see how much we can save in future heating and cooling costs."

Central to the Consortium is SCI-LINK, part of North Carolina State University's College of Education and the Center for Earth Observation at the College of Natural Resources. Other partners

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include: NC Center for Geographic Information Analysis, NC Department of Public Instruction, entities in the NC Department of Environment & Natural Resources, Urban and Regional Information Systems Association, and Environmental Systems Research Institute, Inc (ESRI).

A year ago, neither Carter nor Johnson had any training in GIS. Like the young people they now teach, they are members of their local Boys and Girls Clubs and received their GIS training from NC State graduate students.

"We try to nurture the youth along in the same way we were nurtured along," says Johnson, who for the moment has her sights set on either Spelman College or Clark University.

Kristina Fowler is a master's student at NC State's college of natural resources and assistant to the associate dean of academic affairs. Along with Rita Hagevik of NC State's College of Education and Bill Thomas, she helped initiate the Boys Club project a year ago.

Fowler brims with enthusiasm for the project's

early successes. "What makes this technology so exciting for young people is their ability to create fairly sophisticated presentations of their analyses using the CITYgreen software. It empowers young people because they can clearly see and present to others the economic and aesthetic value of the trees that they have on their sites.

"This program encourages youth to pursue higher education once they graduate from high school and it promotes a greater awareness of career opportunities that are available through the knowledge and use of GIS technology," she adds.

Keosha Johnson is not necessarily planning a career in GIS or even in environmental science. She wants to be a criminal attorney but knows that GIS is one of the tools she may use to make convincing courtroom presentations. "As part of our training, we used GIS to look at how busing routes affect the diversity of schools. You can set up different scenarios and ask a lot of 'what if' questions."

The teaching came full circle in January when Johnson and Carter presented their CITYgreen study of the Boys Club at an NC State-sponsored conference. In attendance were NC State's Board of Trustees and Chancellor Marye Anne Fox.

Much of the Consortium's initial success is attributable to the strength of the Greensboro and Raleigh area middle and high schools, which are known for producing technically savvy students like Johnson and Carter. Although not a standard course at Southwest Guilford High School, GIS is increasingly entering the curriculum. According to environmental science teacher Dee Dee Whitaker, GIS and related visual technologies allow teachers to reach previously disengaged students.

"GIS is a technology kids pick up quickly and truly enjoy. Visual learners have much to gain from GIS. Kids that won't do anything else will be model students down in the GIS lab. So, we consider it a tool, one of many that students will use to gain appreciation for the sciences."

For Southwest Guilford seniors like Bennett Hawley, however, GIS is becoming a pretty serious tool. Hawley and his teachers are participants in the Consortium's Mapping Our School Site project (MOSS). MOSS provides a set of protocols, using a combination of traditional biological data collection techniques and high tech analysis and presentation tools, such as digital photography and GIS, that teachers and students at any grade level can use to gather and analyze information about their school grounds and beyond.

Through the SCI-LINK program, MOSS teachers take a week-long workshop on Arc Voyager, ArcView, and CITYgreen. Back in the classroom, teacher and students gather highly detailed information (including abiotic factors, groundcover, trees, animal evidence, insects and more). within a 33-foot by 33-foot plot on their school grounds.



Ultimately, the
North Carolina
Consortium

Taking the analysis a step further, students use CITYgreen and aerial photographs to conduct ecological analyses of their school site based on tree canopy cover and its relation to buildings and other impervious surfaces. With the CITYgreen analysis students can report carbon sequestration and storage, pollution removal benefits, energy conservation, and tree growth models at their school site, and model the effects of different canopy scenarios.

NC State's Hagevik, a doctoral student in science education, developed the MOSS program and the accompanying website. Serving as a central data repository, the MOSS site (access the site at: www.ncsu.edu/sci-link/studysite) provides downloadable surveying techniques, GIS instructions, data spreadsheets, and basemap files.

Hawley's personal project website features 360-degree panoramic digital photography and a multivariate GIS analysis of the local resources on Southwest Guilford High's school grounds. Through this work, Hawley secured a full scholarship to attend NC State, where he plans to pursue environmental science and join his former GIS instructors at the University's Center for Earth Observation. He also received a prestigious invitation to present at the North Carolina Science Teachers Conference last year.

Teachers in the MOSS program have received new computers, color printers, scanners, and plotters for their classrooms, some provided by their school systems and others donated by businesses and industries.

Increasingly, local natural resource managers and planners are using student-collected data. For the last five years, Whitaker's environmental science students at Southwest Guilford High School

have collected monthly water quality data on Deep River in Greensboro. Once a year they present their assessment of 14 variables, including temperature, micro-invertebrate levels, heavy metals, and PH, to staff of the Greensboro Water Quality Board.

"This project has shown me how to take science outside and relate it to the local environment. It has shown me how to integrate technology into the science curriculum in a new and better way," says Carolyn Moser, a teacher at Leesville Middle School in Raleigh.

Kristina Fowler sees the early successes of the Consortium's technology training as "only the tip of the iceberg." The Consortium plans to extend this collaboration to all five Wake County Boys and Girls Clubs by 2003. Ultimately, she and other consortium members want to take the program to a national level.

"We envision middle and high school students and Boys and Girls Club youth around the country making sophisticated CITYgreen presentations to their local City Council members, showing policymakers the actual benefits of their trees and open spaces." AF

The Consortium wishes to thank EPA Region IV for initiating this project six years ago; Mathematics and Science Network, NC State for further developing the MOSS project; NC GIS Environmental Education Consortium; and many experts, educators, and students for their support.

Alexis Hart writes about environmental issues from his home in Berkeley, California.



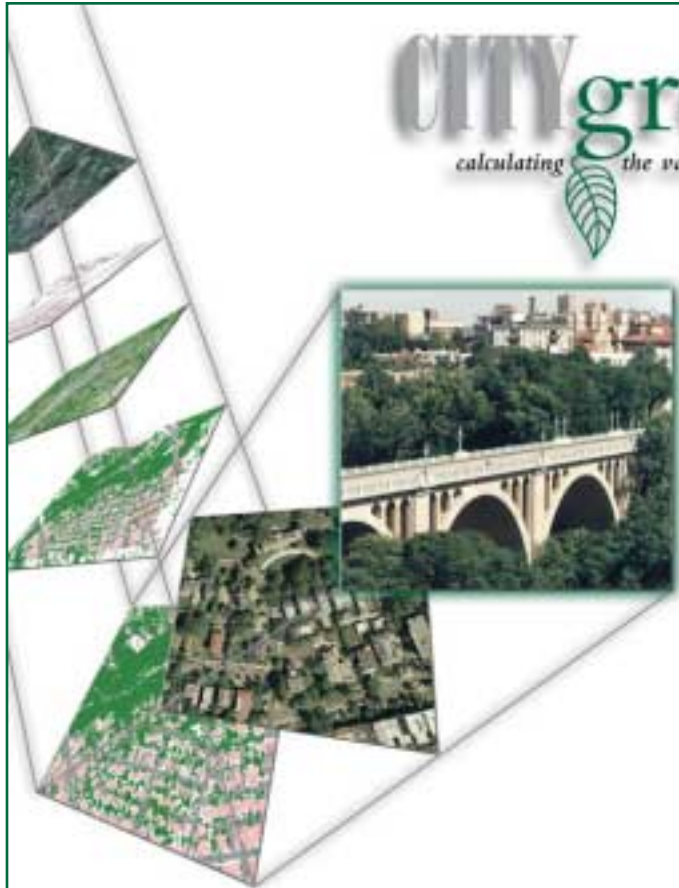

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program
nationwide.

Students use measuring tools and a clinometer (above) to make calculations that will later be plugged into computer formulas.

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